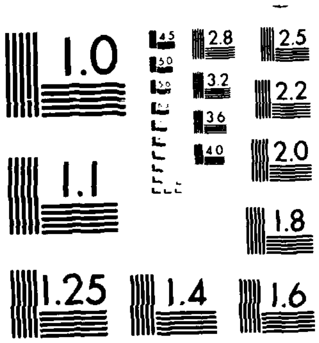
AD-A152 080 ON PREDICTING SUCCESS IN TRAINING FOR MALES AND FEMALES: MARINE CORPS CLE..(U) IOWA UNIV IOWA CITY S B DUNBAR ET AL. 20 FEB 85 TR-85-2-ONR 1/1

UNCLASSIFIED N00014-83-C-0514 F/G 5/9 NL

END




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

3

AD-A152 080

# ON PREDICTING SUCCESS IN TRAINING FOR MALES AND FEMALES: MARINE CORPS CLERICAL SPECIALTIES AND ASVAB FORMS 6 AND 7

Stephen B. Dunbar
and
Melvin R. Novick

ONR Technical Report 85-2

CADA
RESEARCH
GROUP



THE UNIVERSITY OF IOWA

h.4

# ON PREDICTING SUCCESS IN TRAINING FOR MALES AND FEMALES: MARINE CORPS CLERICAL SPECIALTIES AND ASVAB FORMS 6 AND 7

Stephen B. Dunbar
and
Melvin R. Novick

ONR Technical Report 85-2

February 20, 1985



This research was prepared under the Office of Naval Research Contract No. N00014-83-C-0514, Melvin R. Novick, Principal Investigator, The University of Iowa, Iowa City, Iowa.

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

| REPORT DOCUMENTATION PAGE | | READ INSTRUCTIONS BEFORE COMPLETING FORM |
|---|---|---|
| 1. REPORT NUMBER<br>ONR Technical Report 85-2 | 2. GOVT ACCESSION NO.<br>AD-A152050 | 3. RECIPIENT'S CATALOG NUMBER |
| 4. TITLE (and Subtitle)<br>ON PREDICTING SUCCESS IN TRAINING FOR MALES AND FEMALES: MARINE CORPS CLERICAL SPECIALTIES AND ASVAB FORMS 6 AND 7 | | 5. TYPE OF REPORT & PERIOD COVERED<br>Technical Report<br>July 1, 1983 - Feb. 20, 1985<br>6. PERFORMING ORG. REPORT NUMBER |
| 7. AUTHOR(s)<br>Stephen B. Dunbar<br>Melvin R. Novick | | 8. CONTRACT OR GRANT NUMBER(s)<br>N00014-83-C-0514 |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS<br>Melvin R. Novick<br>356 Lindquist Center, The Univ. of Iowa<br>Iowa City, IA 52242 | | 10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS<br>NR150-521 |
| 11. CONTROLLING OFFICE NAME AND ADDRESS<br>Personnel and Training Research Programs<br>Office of Naval Research (Code 458)<br>Arlington, VA 22217 | | 12. REPORT DATE<br>February 20, 1985<br>13. NUMBER OF PAGES<br>48 |
| 14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)<br>Office of Naval Research<br>536 South Clark Street<br>Chicago, IL 60605 | | 15. SECURITY CLASS. (of this report)<br>unclassified<br>15a. DECLASSIFICATION DOWNGRADING SCHEDULE |

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

differential prediction
Johnson-Neyman technique
personnel selection

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The presence of differences between prediction systems for males and females is investigated through a detailed study of clerical specialties in the Marine Corps. When various aptitude composites are used to predict success of recruits in training, sizeable differences in regression functions are found between male and female groups. The paper shows that selected deletion of extraneous ASVAB variables maintains overall predictive efficiency but does not remove the differences between male and female
(continue on back)

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-LF-014-6601

unclassified February 20, 1985
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

regressions. However, when the attainment of a high school diploma is considered, differential prediction is substantially reduced. Implications of these empirical results for the general problem of military personnel selection are discussed.

# On Predicting Success in Training For Males and Females: Marine Corps Clerical Specialties and ASVAB Forms 6 and 7*

Stephen B. Dunbar
and
Melvin R. Novick

The University of Iowa

## Abstract

The presence of differences between prediction systems for males and females is investigated through a detailed study of clerical specialties in the Marine Corps. When various aptitude composites are used to predict success of recruits in training, sizeable differences in regression functions are found between male and female groups. The paper shows that selected deletion of extraneous ASVAB variables maintains overall predictive efficiency but does not remove the differences between male and female regressions. However, when the attainment of a high school diploma is considered, differential prediction is substantially reduced. Implications of these empirical results for the general problem of military personnel selection are discussed.

*Support for this research was provided under contract #N00014-83-C-0514 with the Personnel Training Branch of the Office of Naval Research. We are indebted to Ming-mei Wang, William H. Sims, and three referees for comments on an earlier draft.

Requests for reprints should be sent to Stephen B. Dunbar, 374 Lindquist Center, The University of Iowa, Iowa City, IA 52242.

On Predicting Success in Training for Males and Females: Marine Corps Clerical Specialties and ASVAB Forms 6 and 7

The literature in personnel selection and classification is replete with examples of what has been called situational specificity in predicting job performance. Unique characteristics of tasks peculiar to a particular job or job family have been thought to moderate the relationship between a global set of predictors and on-the-job performance (cf. Ghiselli, 1966). Situational specificity in the prediction of success in training for military occupations, for example, has been a focus of attention for test validation at least since Stewart's (1947) analysis of occupational differences in scores from the Army General Classification Test. Accordingly, validation research performed in the military since that time has concentrated on the relation between test scores and training success within specific occupational groups (as in, for example, Valentine, 1977).

A recent case against the concept of situational specificity has been made in the work of Schmidt, Hunter and associates (see, for example, Schmidt & Hunter, 1977 and Schmidt, Hunter & Pearlman, 1981). The procedures outlined in their work for studies of validity generalization have shown that a substantial amount of variability in observed validity coefficients (predictor-criterion correlations) could be due to the presence of statistical artifacts such as range restriction, criterion unreliability and simple sampling error. Schmidt and Hunter (1981) also cast doubt on the general presence of race-differentiated prediction, claiming that "cognitive ability tests are equally valid for minority and majority applicants and are fair to minority applicants in that they do

not underestimate the expected job performance of minority groups" (p. 1128).

Although the evidence amassed by these authors is formidable, few would question the need for continued investigation of moderator variables in selection contexts. As noted by Linn and Dunbar (1985), for example, a difference exists between concluding that validities can be more easily generalized than once thought and claiming that situational specificity does not exist. Tenopyr and Oeltjen (1982) express similar sentiments regarding the validity generalization and situational specificity dichotomy, while Novick (1982) provides specific illustrations of the importance of continued study of group differences in settings where inference is crucial.

The investigation of differences in prediction for males and females can be viewed as an instance of the specificity concept; however, explanations of the causes of this kind of specificity are clearly different from those made for specificity by job site, for instance, where causes might not be entirely psychological in nature. The notion that a particular moderator effect such as the male-female dichotomy can be viewed as an instance of the specificity concept stems from an assumption that causes of such differences are complex and that the demographic variable is only an available surrogate measure of these causes. Although arguments about whether investigations of differences in criterion-related validity should be conducted with correlation coefficients (differential validity) or regression parameters (differential prediction) have clouded some of the important substantive issues in such studies, variation in within-group predictions has been observed in both educational and employment settings. As noted by Linn (1982), however, a

disproportionately small number of these studies have examined differences for men and women. The Defense Advisory Committee on Military Personnel Testing has noted the existence of differences in regressions for men and women and has spoken to the need for more detailed investigations of these differences in predicting training success in the military (cf. Defense Advisory Committee, 1983).

This paper addresses the general issue of differential prediction for men and women by means of a detailed analysis of selected job classifications in the clerical specialty area of the Marine Corps. Our particular interest lies in the identification of differences between predicted training success for males and females based on ASVAB composite scores and subtests typically used for selection. The search for alternative predictive composites that yield equally accurate, non-differentiated regression functions is another concern of the analysis.

## Related Research

The study of different prediction systems for men and women has a growing history in Air Force technical training programs. Gordon (1953) was the first to find stable differences between regression equations of men and women--female performance was consistently underpredicted in this early study. In a more recent validation study of composites used for predicting performance in Air Force mechanical training courses, Valentine (1977) found substantial differences between the predicted scores based on male and female regression equations in nine courses. For example, differences between observed female means and the female means predicted from the male regressions of course grades on the selection

composite ranged from .10 to .43 female standard deviations (Linn, 1984). For the nine training courses examined, mean female performance was underpredicted by an average of .28 female standard deviations.

In contrast to the large discrepancies noted by Valentine (1977), Webster, Booth, Graham, and Alf (1978) found limited evidence for differential prediction for men and women in Navy hospital training schools. These authors examined the impact of a common prediction equation on the number of false-positive and false-negative decisions made for various cut-scores on the predictors. They found significant differences between males and females in the proportion of recruits misclassified, with males showing a higher proportion of misclassifications due to underprediction of their criterion scores using a common equation. Although the criterion used by Webster, et al is different, the contrast this study poses with the previous Air Force results makes it reasonable to expect differences between regressions for men and women to be, at least to some extent, course specific. We return to this observation in discussion of the results presented below.

In a study of the regression of undergraduate grades on an ACT battery, Gamache and Novick (1985) investigated the presence of male-female differentiated prediction for selected college programs (liberal arts, business, medicine, etc.). They identified differences between the predictions of grade-point average from ACT scores to be as much as .45 female standard deviations on the criterion when the within-group regressions were evaluated at the female mean on the predictor. Again, the effect was to underpredict female criterion performance in most programs and with most variables. Similar tendencies for male equations to underpredict female performance have been observed in educational settings by

Linn (1973), ACT (1973), and Breland and Griswold (1982). The findings of Breland and Griswold (1982) are noteworthy in that underprediction of female performance was consistent throughout the predictor score scales and was documented through traditional regression techniques and a contingency table analysis.

## Method

### Data Source

Data for this report come from validation files used in a study of the Armed Services Vocational Aptitude Battery (ASVAB), Forms 6 and 7 (Sims and Hiatt, 1981). We limit consideration to recruits assigned to one of nine training courses classified as clerical specialties. Table 1 lists these clerical specialties and sample sizes available for analysis. The proportion of the total sample that is female ranges from .10 for Basic Supply Stock Clerks to .35 for Administrative and Unit Diary Clerks.

Insert Table 1 About Here

Predictor variables of special interest in this study are the ASVAB Clerical Composite (CL) used for selection and the four ASVAB subtests from which the Clerical Composite is constructed. These subtests are Arithmetic Reasoning (AR), Word Knowledge (WK), Attention to Detail (AD), and an attitudinal measure called the Attentiveness Scale (CA). All ASVAB variables except CA were transformed to standardized scores using

the corrected conversion tables for Forms 6 and 7. This placed the composite on a scale with a mean of 100 and a standard deviation of 20 and the subtests on scales with means of 50 and standard deviations of 10. Because no standard scale was developed for CA, its scores range from 0 to 20. The available criterion variable is final course grade (FCG) in training. These scores are reported on a nominal scale of 0-100, with values for most training courses falling between 70 and 100.

## Procedure

The distributions of ASVAB predictors and course grade criterion were first examined for ceiling and/or floor effects which might jeopardize the linearity and homoscedasticity requirements of the least squares regressions and for outliers. In several training courses, observations were deleted because of extreme scores on the criterion - Sims and Hiatt (1981) note that extremely low criterion scores for these courses appear to be arbitrarily determined. Area transformations of the criterion variable were also considered in situations where heteroscedasticity appeared to be a concern; however, no such transformations had a marked effect on the joint criterion-predictor distributions. Separate least squares regression equations for predicting training success were determined for the clerical composite, CL, and for each of the subtests of which it is composed. The subtests were also considered as multiple predictors of training success. Although the data available for analysis are clearly subject to the effects of range restriction on the independent variables, no attempts to remove these effects were considered in this study. One justification for this is the focus in this study on regressions rather than correlations; these are less affected by explicit

selection. The reported amounts of criterion variance accounted for by ASVAB test scores should, however, be interpreted accordingly.

Preliminary tests of null hypotheses of equal within-group slopes and intercepts were conducted using conventional techniques. For these tests an alpha level of .10 was established for rejection, the rationale being that Type II errors should be lessened in the study of differential prediction. In addition to these tests, regions of the predictor score scale where important differences between male and female regression functions existed were identified using the Johnson-Neyman technique. This technique identifies values on the score scale where the 100 (1 - p) percent prediction interval for differences between predicted scores does not include zero. Regions identified with the Johnson-Neyman analyses were used along with the observed predictor distributions to determine the proportion of each sample that might be affected by differential prediction. A concise description of the Johnson-Neyman procedure is provided by Pottoff (1984).

The search for alternative predictive composites was guided by the approach described in Gamache and Novick (1985). This is basically an iterative search for a set of predictors (or a weighted composite of predictors) providing accuracy sufficient for administrative purposes while at the same time minimizing the proportion of individuals affected by any differential prediction that might exist.

## Results

Within-group means and standard deviations for the nine courses are reported in Table 2. While the distributions of composite scores vary

from course to course, there seems to be a marked tendency for females to have higher means on the clerical composite. Mean differences between males and females range from 7 to 15 scaled score points with females scoring an average of 9 points higher than males across the nine schools. Female standard deviations on the selection composite also tend to be smaller than those for males. The distributions of the criterion, on the other hand, show mean differences between males and females that range from virtually no difference for the Personal Financial Records course to 4.7 score points in favor of females for the Aviation Supply course. Although criterion standard deviations for men and women in the same training course are similar, female SD´s are smaller than male SD´s for all but two courses.

---

Insert Table 2 About Here

---

The results of within-group regression analyses are presented in Table 3, which contains slopes, intercepts, and standard errors of estimate for each of the nine clerical schools. Here ASVAB variables have been considered as single predictors of training success.

---

Insert Tables 3 And 4 About Here

---

Regression parameters and standard errors for the multiple predictor analyses appear in Table 4.

Inspection of the regression parameter estimates in Table 3 reveals substantial differences between male and female prediction equations for all training courses using the Clerical composite as sole predictor.

Although the estimates no doubt are influenced by an unspecified degree of administrative and voluntary selection of recruits into other training courses for which they qualify on the basis of other ASVAB composites, the male-female differences, which vary across courses, are not likely to be explained entirely by differences in selectivity. Of particular interest in the regressions involving CL, for example, are apparent differences between male and female slopes in Unit Diary, Basic Supply Stock, Personal Financial Records and the three aviation-related courses. In addition, where differences between within-group standard errors of estimate exist, a general trend toward smaller errors is present for females.

Smaller standard errors of estimate for females are also seen in the full regression models for subtests as multiple predictors in Table 4. Also observed from the coefficients in Table 4 is the fact that the male-female grouping variable (MF) receives a positive weight in six of the nine training courses studied even after the effects of interaction terms are considered. With males and females coded 0 and 1, respectively, these results indicate female performance on the criterion to be, in some cases, substantially higher in clerical training than would be predicted on the basis of the male regression equations for the individual subtests. The combination of MF and the interaction terms leads to average female performance that is higher than the regression equations for men would predict it to be for all courses, although the degree varies from course to course. Another observation of note with respect to these results is the relatively small contribution being made to either male or female prediction by AD in nearly every training course.

If one corrects the weight estimated for CA for scaling differences, one sees a small contribution being made by that variable as well.

Differences between male and female within-course regressions expected to be stable over sampling are indicated in Table 5, which contains the results of hypothesis tests of parallel and coincident regressions. F-ratios and rejection levels are reported for all schools using both single and multiple predictor models. In general, the statistics in Table 5 indicate greater similarity between the slopes of male and female regression functions than between their intercepts.

Insert Table 5 About Here

The null hypothesis of parallel regressions using the Clerical Composite is rejected in three of nine courses, and is nearly rejected in a fourth course. Although evidence for differences between slopes when individual subtests are considered exists for three courses, the salient feature of the results in Table 5 is a consistent trend toward differences between intercepts, regardless of the particular variables used for prediction. The number of rejections of equal intercept hypotheses is much greater than would be expected if observed differences were due to sampling fluctuations alone.

As indicated earlier in the paper, the Johnson-Neyman technique is perhaps best suited to the concerns of this study, since our focus is on assessing the importance of contrasting regressions to selection decisions. Regions identified using this technique for the single predictor cases are provided in Table 6 along with the proportions of the total sample and female sample potentially affected by the observed

differences. When CL is used to predict course grades, the weighted average proportion of females with test scores in the Johnson-Neyman region (with female sample sizes as weights) is .78 across courses for which a region exists, and .60 across all courses. The proportion of females in these regions is largest in the Administrative sample (.86) and smallest in the Personal Financial Records sample (.44). The specific regions of the CL scale identified show that a nominal cut score for selection of 100 would lie in a region of important difference between male and female regressions for the Administrative and Aviation Operations courses and on the edge of such a region for the Personal Financial Records course. In addition, the female mean lies within the difference region provided by the Johnson-Neyman technique in all courses with regions for the selection index, CL, except Personal Financial Records.

Insert Table 6 About Here

A further indication of the magnitude of male-female differences is provided in Table 7, which contains differences between criterion predictions for men and women at the mean of the female predictor distributions, expressed in female standard deviation units. Negative differences here indicate the underprediction of female performance on the criterion, while positive ones would indicate overprediction. The values reported in Table 7 show the contrast between predictions for men and women to be quite uniform and dramatic regardless of training course or predictor variable considered. The male-female differences reported in Table 7 range from .14 female standard deviations for the CL composite

in the Supply Stock course to 1.03 female standard deviations for CA in the Aviations Operations course. A weighted average difference of about one third of a standard deviation when the composite is used as sole predictor calls into serious question the hypothesis that females are not adversely affected by selection on the basis of a prediction equation for males. Indeed, the average number of scaled score points that would have to be added to an average female composite score to obtain the criterion score predicted by the female equation is 9.88. An appropriate degree of caution is in order regarding the stability of male-female differences for training courses with small sample sizes for women. However, the fact that these differences are in the same direction as differences found in the Gordon and Valentine studies cited earlier lends support to an argument that women may well be adversely affected by use of a combined equation for selection.

Insert Table 7 About Here

## Alternative Predictive Composites

The use of ASVAB composites for predicting training success is obviously complicated by the kinds of within-group differences observed in this study. Users of ASVAB are faced with a dilemma encountered by many when issues of bias in selection arise. Separate algorithms for many training courses will no doubt lead to more accurate predictions, but they make selection rules complex and sometimes difficult to justify from a policy standpoint. Gamache and Novick (1985) have discussed these problems in the context of educational selection and suggest several

approaches for dealing with the problem. Clearly, a search for alternative composites, which ameliorate the problem of differential prediction without sacrificing predictive accuracy, is suggested by the results heretofore considered.

Several alternative regression models for Marine Corps clerical specialties were evaluated in an attempt to develop a more suitable selection index. Models in which selected ASVAB subtests were deleted yielded small decrements in the amount of differential prediction observed for some training programs; these decrements typically involved interaction terms. Table 8, for example, contains the full regression models that consider AR and WK as predictors. Least squares estimates of regression weights, standard errors of estimate, and squared multiple correlations are presented. One can see from the estimates in Table 8 that the regressions involving only AR and WK do not sacrifice much in terms of predictive accuracy. With AD and CA removed from the equation, the standard errors of estimate increase by at most two-tenths of a criterion score point. The average reduction in the percentage of variance explained by AR and WK versus that explained by all predictors is 1.6% for men and 2.4% for women.

---

Insert Tables 8 and 9 About Here

---

One also observes from the estimates in Table 8 that differences between intercepts still remain, despite the removal of AD and CA. Tests of hypotheses of differential prediction using AR and WK, shown in Table 9 corroborate this finding. Null hypotheses of parallel regressions failed to be rejected for all of the courses. However, the combined

influence of the group and interaction terms led to rejection of the coincidence hypotheses in all but two of the training schools. As shown below, the restricted set of predictors actually slightly increased, rather than decreased, the average magnitude of differences between male and female predictions.

The consistent differences between intercepts of male and female regressions can have a number of explanations. In any case, the consistent underprediction of female performance suggests that the effect of a component of performance on the relevant criterion is specific to women. Initial analyses make apparent that other ASVAB variables considered in this study do not adequately measure such a component. Indeed, indicators of behavior that could effect success in a training program to a greater extent than they could high scores on selection tests (such as level of general education or previous experience in a particular area of training) are likely better at characterizing the component that is missing from the regression models considered thus far.

Although no indication of previous experience is available in the present validation context, Marine Corps recruits are distinguished by whether or not they have received a high school diploma. Accordingly, differential prediction tests were conducted for a restricted group of recruits with high school diplomas, using CL as single predictor and AR and WK as joint predictors of training success. Sample size limitations precluded a complete analysis of these data with education level considered an independent variable in addition to MF and the ASVAB variables.

Hypotheses of no difference between male and female intercepts were rejected at the 10 percent level for only four training courses when

using the two models. Differences between slopes were detected for two training courses with the composite as predictor and for no courses with AR and WK as predictors. The Johnson-Neyman technique applied to the high school graduate sample identified regions for the same five training schools for which regions were identified using CL in the complete sample. However, the proportions of recruits potentially affected by contrasting male-female regressions were generally smaller than the corresponding proportions when all recruits were considered.

Comparisons between male and female predictions for the sample of high school graduates and the total sample, provided at the female mean in Table 10, indicate a that a substantial reduction in differential prediction can be achieved by using information about the receipt of a high school diploma. Although the predictions in Table 10 clearly show that the AR-WK combination yields differences for men and women of greater magnitude, the predictions for the sample of high school graduates show smaller differences for both regression models shown. The most pronounced reductions are observed in the Administrative, Unit Diary, and Communications Center courses when the composite is the sole predictor. Although females continue to be underpredicted, the magnitude of that underprediction is reduced on average with an additional consideration of high school attainment. Again, these results should be viewed as suggestive rather than definitive indications of the importance of non-test variables in reducing prediction differences between men and women because of the small sample sizes for women in several training courses.

---

Insert Table 10 About Here

---

## Discussion

The results of this study present a challenge to any strong version of the validity generalization hypothesis. Sizeable differences between regressions and predictions were found for males and females in various Marine Corps clerical specialties. The Johnson-Neyman analysis demonstrates that prediction systems are not identical across groups for all training schools using the available personnel data. This is not to say that the criterion-predictor relationship is not generalizable. Rather, we suggest that it is best viewed with respect to clusters of specialties for which greater homogeneity exists across male and female cohorts and with due regard to relevant non-test variables such as attainment of a high school diploma.

The fact that a reduction in differential prediction was observed when differences between males and females in high school attainment were removed is noteworthy. In other selection contexts, such as college admissions, one routinely observes that optimal prediction occurs with some weighted combination of admisssion test scores and a measure of high school performance such as class rank or grade-point average. The argument suggested by the analyses in this paper would advance the hypothesis that individual and group differences related to performance on the training criterion are explained in part by a performance composite much

like high school achievement. To ignore such information in the assignment of recruits to clerical specialties creates systematic group differences in expected performance. This is the kind of hypothesis that should be validated in other selection contexts and with sets of data containing a larger representation of women.

One referee has suggested that the male-female variable may be confounded with socioeconomic status (SES) because of higher selectivity in the female population. A glance at the means and standard deviations of CL, in particular, from Table 2 confirms this selectivity, although it is not clear that the restriction of range implied by sample statistics is not a characteristic of the female applicant pool itself rather than the result of differential selectivity into the validation sample. The finding that attainment of a high school diploma reduces differential prediction is consistent with the hypothesis of SES confounding because of the known positive relationship between SES and high school achievement. However, the suggestion is not damaging to the important conclusions of this study. Differences between male and female regressions are apparent with the use of this version of ASVAB and the available personnel data and, furthermore, these differences can be reduced by the use of a prior education variable in prediction algorithms. In addition, whatever the complex of variables is that causes the male-female differences observed here, our results provide some disconfirmation of a strong statement that ASVAB composites and subtests make essentially the same predictions regardless of other characteristics of Marine Corps trainees. Were the present results inconsistent with previous findings from studies with large and balanced samples of men and

women, this position would be more difficult to support on the basis of present findings alone.

The same referee also suggests that race may be another confounding factor because these tests tend to overpredict for blacks (cf. Sims & Hiatt, 1981). This hypothesis has not been examined here even though the present authors recognize it as a possibility. For the overprediction phenomenon typically observed for blacks in race comparisons to effect the male-female differences observed in this study, the female samples would have to have a markedly higher proportion of white trainees than the male samples.

A pragmatic view of the problem of differential prediction in employment testing would suggest a different solution. Discussions within the Defense Advisory Committee have made clear to these authors that the use of separate equations for men and women, or for blacks and whites, is not a palatable solution to the problem of contrasting regressions for important subpopulations. Rather, palatable solutions are those that involve blocking on non-sensitive variables, such as education level, that correlate with sex, race, SES, and a future performance criterion. When this is feasible, the resulting selection procedure is less likely to create a relative disadvantage for members of any particular group, however membership in that group happens to be defined. Using information about the receipt of a high school diploma in predicting training success in the military is a useful first step in the employment of such variables.

References

American College Testing Program. (1978). Assessing students on the way to college. Technical Report, Vol. 1.

Breland, H.M. & Griswold, P.A. (1982). Use of a performance test as a criterion in a differential validity study. Journal of Educational Psychology, 74, 713-721.

Defense Advisory Committee. (1983). Biennial report of the Defense Advisory Committee on military personnel testing. Office of the Secretary of Defense.

Gamache, L.M. & Novick, M.R. (1985). Choice of variables and gender differentiated prediction within selected academic programs. Journal of Educational Measurement, 22, in press.

Ghiselli, E.E. (1966). The validity of occupational aptitude tests. New York: Wiley.

Gordon, M. A. (1953). A study in the applicability of the same minimum qualifying scores for technical schools to white males, WAF, and Negro males. Technical Report 53-34. Lackland AFB, TX: Personnel Research Laboratory, Human Resources Research Center.

Linn, R.L. (1973). Fair test use in selection. Review of Educational Research, 43, 139-164.

Linn, R.L. (1982). Ability testing: Individual differences, prediction, and differential prediction. In Wigdor, A.K. and Garner, W. R. (Eds.), Ability Testing: Uses, Consequences, and Controversies. Committee on Ability Testing, National Academy Press.

Linn, R. L. (1984). Selection bias: Multiple meanings. Journal of Educational Measurement, 21, 33-47.

Linn, R.L. & Dunbar, S.B. (1985). Validity generalization and predictive bias. In Berk, R. (Ed.), Performance Assessment: The State of the Art. Baltimore: Johns Hopkins University Press, in press.

Novick, M.R. (1982). Educational Testing: Inferences in relevant subpopulations. Educational Researcher, 11, 4-10.

Pottoff, R. (1983). Johnson-Neyman technique. In Kotz, S. & Johnson, N.L. (Eds.), Encyclopedia of Statistical Sciences, Vol. 4. New York: John Wiley & Sons.

Schmidt, F.L. & Hunter, J.E. (1977). Development of a general solution to the problem of validity generalization. Journal of Applied Psychology, 62, 529-540.

Schmidt, F.L. & Hunter, J.E. (1981). Employment testing: Old theories and new research findings. American Psychologist, 36, 1128-1137.

Schmidt, F.L., Hunter, J.E. and Pearlman, K.L. (1981). Task differences as moderators of aptitude test validity in selection: A red herring. Journal of Applied Psychology, 66, 166-186.

Sims, W.H. & Hiatt, C.M. (1981). Validation of the Armed Services Vocational Aptitude Battery (ASVAB) Forms 6 and 7 with Applications to ASVAB Forms 8, 9, and 10. CNA Report 1160. Alexandria, VA: Center for Naval Analyses.

Stewart, N. (1947). AGCT scores of Army personnel grouped by occupation. Occupations, the Vocational Guidance Journal, 26, 5-41.

Tenopyr, M.L. & Oeltjen, P.D. (1982). Personnel selection and classification. In Rosenzweig, M.R. and Porter, L.W. (Eds.), Annual Review of Psychology. Palo Alto, CA: Annual Reviews.

Valentine, L.D. (1977). Prediction of Air Force technical training success from ASVAB and educational background. AFHRL-TR-77-18,

Lackland AFB, TX: Personnel Research Division, Air Force Human Resources Laboratory.

Webster, E.G., Booth, R.F., Graham, W.K., & Alf, E.F. (1978). A sex comparison of factors related to success in Naval Hospital Corps school. Personnel Psychology, 31, 95-106.

Table 1

Clerical Specialties and Corresponding Sample Sizes

| Specialty | Total | Male (%) | Female (%) |
|---|---|---|---|
| Administrative | 1287 | 841 (65) | 446 (35) |
| Personnel | 170 | 125 (74) | 45 (26) |
| Unit Diary | 148 | 96 (65) | 52 (35) |
| Basic Supply Stock | 955 | 848 (89) | 107 (11) |
| Pers. Fin. Records | 326 | 263 (81) | 63 (19) |
| Aviation Operations | 233 | 190 (82) | 43 (18) |
| Aviation Maint. Admin. | 200 | 166 (83) | 34 (17) |
| Aviation Supply | 458 | 408 (89) | 50 (11) |
| Communications Center | 656 | 575 (88) | 81 (12) |
| Totals | 4433 | 3512 (79) | 921 (21) |

Table 2

Means and Standard Deviations for Males and Females on FCG and ASVAB Predictors

| Training Course | Variable | Male Mean | Male SD | Female Mean | Female SD |
|---|---|---|---|---|---|
| Administrative | FCG | 82.0 | 7.0 | 86.6 | 6.3 |
| | CL | 106.9 | 14.0 | 117.1 | 10.2 |
| | AR | 50.8 | 8.3 | 52.6 | 7.4 |
| | WK | 53.2 | 7.1 | 56.9 | 5.6 |
| | AD | 54.0 | 10.8 | 61.4 | 9.9 |
| | CA | 12.3 | 3.3 | 13.6 | 2.9 |
| Personnel | FCG | 89.2 | 5.4 | 91.4 | 4.3 |
| | CL | 108.4 | 13.4 | 114.6 | 10.3 |
| | AR | 52.0 | 7.7 | 52.3 | 7.2 |
| | WK | 54.3 | 6.7 | 56.1 | 5.5 |
| | AD | 53.6 | 11.3 | 59.3 | 11.1 |
| | CA | 12.1 | 3.0 | 13.1 | 3.2 |
| Unit Diary | FCG | 82.0 | 6.8 | 86.8 | 7.1 |
| | CL | 110.4 | 10.5 | 118.7 | 9.2 |
| | AR | 53.2 | 7.3 | 54.4 | 7.6 |
| | WK | 53.9 | 6.7 | 57.6 | 4.7 |
| | AD | 53.9 | 10.6 | 61.2 | 10.6 |
| | CA | 12.8 | 3.4 | 13.5 | 2.5 |
| Basic Supply Stock | FCG | 82.1 | 7.6 | 85.4 | 8.1 |
| | CL | 109.3 | 11.5 | 119.3 | 9.2 |
| | AR | 53.7 | 6.6 | 54.9 | 6.9 |
| | WK | 52.5 | 6.6 | 57.3 | 5.4 |
| | AD | 57.4 | 10.9 | 61.0 | 10.7 |
| | CA | 11.5 | 3.3 | 14.1 | 3.1 |
| Personal Financial Records | FCG | 83.3 | 7.3 | 86.4 | 6.6 |
| | CL | 112.8 | 10.2 | 119.7 | 8.2 |
| | AR | 54.2 | 7.2 | 53.7 | 7.0 |
| | WK | 56.3 | 5.3 | 58.3 | 4.4 |
| | AD | 55.1 | 11.3 | 60.7 | 9.4 |
| | CA | 12.1 | 3.1 | 14.4 | 2.8 |

Table 2 Continued

| Training Course | Variable | Male Mean | Male SD | Female Mean | Female SD |
|---|---|---|---|---|---|
| Aviation Operations | FCG | 86.2 | 5.8 | 90.8 | 4.6 |
| | CL | 101.7 | 14.0 | 116.9 | 8.3 |
| | AR | 49.1 | 7.4 | 53.6 | 6.1 |
| | WK | 52.3 | 6.2 | 57.3 | 4.3 |
| | AD | 52.8 | 11.7 | 59.8 | 9.7 |
| | CA | 10.4 | 3.1 | 13.0 | 3.2 |
| Aviation Maintenance Administration | FCG | 77.0 | 8.1 | 81.0 | 6.4 |
| | CL | 103.8 | 13.2 | 117.4 | 8.6 |
| | AR | 49.6 | 7.4 | 51.7 | 6.9 |
| | WK | 52.8 | 6.1 | 57.2 | 5.2 |
| | AD | 53.5 | 11.5 | 63.0 | 10.0 |
| | CA | 11.0 | 3.3 | 13.0 | 3.0 |
| Aviation Supply | FCG | 81.6 | 8.1 | 86.3 | 7.0 |
| | CL | 101.7 | 13.5 | 115.3 | 9.8 |
| | AR | 49.2 | 7.6 | 51.4 | 7.2 |
| | WK | 51.8 | 6.5 | 57.5 | 4.6 |
| | AD | 53.1 | 11.8 | 60.7 | 10.9 |
| | CA | 10.6 | 3.1 | 12.4 | 2.5 |
| Communications Center | FCG | 82.3 | 7.6 | 86.0 | 5.7 |
| | CL | 106.0 | 11.7 | 114.4 | 9.4 |
| | AR | 49.3 | 8.0 | 51.6 | 8.3 |
| | WK | 52.4 | 7.1 | 56.3 | 5.8 |
| | AD | 55.9 | 12.1 | 60.6 | 9.8 |
| | CA | 11.8 | 3.4 | 12.6 | 3.1 |

Table 3

Single Predictor Regression Analyses
for Nine Clerical Training
Courses

| Predictor | Combined bo | Combined b1 | Combined RMSE | Male bo | Male b1 | Male RMSE | Female bo | Female b1 | Female RMSE |
|---|---|---|---|---|---|---|---|---|---|
| Administrative | | | | | | | | | |
| CL | 55.66 | .25 | 6.27 | 59.25 | .21 | 6.39 | 56.01 | .26 | 5.74 |
| AR | 63.82 | .38 | 6.47 | 63.91 | .36 | 6.41 | 67.26 | .37 | 5.72 |
| WK | 62.42 | .39 | 6.66 | 64.46 | .33 | 6.66 | 68.69 | .32 | 6.09 |
| AD | 75.85 | .14 | 7.00 | 77.23 | .09 | 6.99 | 82.53 | .07 | 6.30 |
| CA | 73.83 | .45 | 7.01 | 78.19 | .31 | 6.98 | 81.35 | .39 | 6.24 |
| Personnel | | | | | | | | | |
| CL | 69.51 | .18 | 4.66 | 70.34 | .17 | 4.89 | 70.25 | .18 | 3.91 |
| AR | 74.20 | .30 | 4.72 | 73.76 | .30 | 4.91 | 75.90 | .30 | 3.78 |
| WK | 74.77 | .27 | 4.92 | 73.49 | .29 | 5.06 | 84.05 | .13 | 4.30 |
| AD | 86.32 | .06 | 5.18 | 85.71 | .07 | 5.37 | 91.97 | -.01 | 4.36 |
| CA | 85.37 | .36 | 5.12 | 86.08 | .26 | 5.37 | 85.38 | .46 | 4.09 |
| Unit Diary | | | | | | | | | |
| CL | 54.24 | .25 | 6.71 | 65.79 | .15 | 6.67 | 44.45 | .36 | 6.29 |
| AR | 67.35 | .30 | 6.92 | 69.95 | .23 | 6.65 | 66.13 | .38 | 6.53 |
| WK | 61.08 | .41 | 6.80 | 67.72 | .26 | 6.62 | 52.76 | .59 | 6.56 |
| AD | 82.46 | .02 | 7.28 | 88.00 | -.11 | 6.75 | 82.56 | .07 | 7.11 |
| CA | 77.31 | .49 | 7.12 | 78.04 | .31 | 6.77 | 76.52 | .76 | 6.89 |
| Basic Supply Stock | | | | | | | | | |
| CL | 56.49 | .24 | 7.22 | 58.36 | .22 | 7.17 | 42.71 | .36 | 7.48 |
| AR | 59.23 | .42 | 7.18 | 60.61 | .40 | 7.13 | 52.79 | .59 | 7.07 |
| WK | 64.35 | .34 | 7.38 | 65.76 | .31 | 7.31 | 59.01 | .46 | 7.79 |
| AD | 80.41 | .04 | 7.72 | 80.49 | .03 | 7.59 | 84.84 | .01 | 8.18 |
| CA | 78.03 | .37 | 7.62 | 78.64 | .30 | 7.53 | 78.44 | .49 | 8.04 |

Table 3 Continued

| Predictor | Combined bo | Combined bl | Combined RMSE | Male bo | Male bl | Male RMSE | Female bo | Female bl | Female RMSE |
|---|---|---|---|---|---|---|---|---|---|
| Personal Financial Records | | | | | | | | | |
| CL | 48.32 | .31 | 6.51 | 52.85 | .27 | 6.74 | 24.92 | .51 | 5.20 |
| AR | 54.79 | .54 | 6.14 | 55.05 | .52 | 6.24 | 52.03 | .64 | 4.92 |
| WK | 73.32 | .19 | 7.19 | 76.85 | .11 | 7.26 | 62.80 | .40 | 6.46 |
| AD | 76.07 | .14 | 7.08 | 76.88 | .12 | 7.16 | 76.54 | .16 | 6.52 |
| CA | 78.70 | .42 | 7.13 | 79.67 | .30 | 7.22 | 79.04 | .51 | 6.54 |
| Aviation Operations | | | | | | | | | |
| CL | 72.33 | .14 | 5.50 | 74.38 | .12 | 5.56 | 90.24 | .00 | 4.64 |
| AR | 73.90 | .26 | 5.53 | 73.61 | .26 | 5.47 | 92.84 | -.04 | 4.64 |
| WK | 77.50 | .18 | 5.76 | 80.08 | .12 | 5.75 | 94.92 | -.07 | 4.63 |
| AD | 80.08 | .13 | 5.67 | 80.34 | .11 | 5.65 | 89.81 | .02 | 4.64 |
| CA | 85.47 | .14 | 5.85 | 86.62 | -.04 | 5.79 | 90.04 | .06 | 4.64 |
| Aviation Maintenance Administration | | | | | | | | | |
| CL | 54.94 | .21 | 7.47 | 55.17 | .21 | 7.68 | 69.02 | .10 | 6.42 |
| AR | 54.50 | .46 | 7.24 | 53.24 | .48 | 7.34 | 67.41 | .26 | 6.22 |
| WK | 58.85 | .35 | 7.71 | 59.15 | .34 | 7.90 | 74.50 | .11 | 6.45 |
| AD | 73.47 | .08 | 7.96 | 74.22 | .05 | 8.14 | 82.35 | -.02 | 6.48 |
| CA | 73.85 | .34 | 7.93 | 73.69 | .30 | 8.11 | 81.63 | -.05 | 6.48 |
| Aviation Supply | | | | | | | | | |
| CL | 55.38 | .26 | 7.33 | 55.01 | .26 | 7.38 | 69.37 | .15 | 6.88 |
| AR | 62.16 | .40 | 7.56 | 62.21 | .39 | 7.58 | 68.53 | .35 | 6.56 |
| WK | 62.08 | .38 | 7.76 | 62.28 | .37 | 7.78 | 91.16 | -.08 | 7.02 |
| AD | 74.24 | .15 | 7.97 | 74.68 | .13 | 8.01 | 80.99 | .09 | 6.96 |
| CA | 79.04 | .28 | 8.11 | 79.40 | .20 | 8.13 | 84.08 | .18 | 7.02 |
| Communications Center | | | | | | | | | |
| CL | 52.78 | .28 | 6.73 | 53.19 | .27 | 6.90 | 59.58 | .28 | 5.25 |
| AR | 61.56 | .43 | 6.65 | 60.93 | .43 | 6.78 | 70.02 | .31 | 5.07 |
| WK | 62.12 | .39 | 6.96 | 62.43 | .38 | 7.11 | 69.78 | .29 | 5.44 |
| AD | 84.01 | -.02 | 7.49 | 84.49 | -.04 | 7.60 | 85.99 | -.00 | 5.69 |
| CA | 79.20 | .30 | 7.43 | 78.80 | .30 | 7.55 | 84.75 | .10 | 5.68 |

bo = intercept, bl = slope, RMSE = root mean-squared error

Table 4

Regression Models for Multiple Predictors in Nine Clerical Specialties

| | Adminis-trative | Personnel | Unit Diary | Supply Stock | P. Fin. Records |
|---|---|---|---|---|---|
| AR | .27 | .22 | .17 | .33 | .50 |
| WK | .19 | .19 | .18 | .21 | .05 |
| AD | .04 | .01 | -.08 | -.00 | .04 |
| CA | .23 | .27 | .36 | .26 | .19 |
| MF | 2.39 | 3.90 | -25.19 | -9.62 | -18.32 |
| MF*AR | .03 | .05 | .02 | .19 | .10 |
| MF*WK | -.01 | -.08 | .30 | .04 | .22 |
| MF*AD | -.01 | -.03 | .12 | .02 | .02 |
| MF*CA | .03 | .12 | .28 | -.19 | .13 |
| CONSTANT | 52.61 | 64.14 | 63.03 | 50.19 | 49.09 |
| RMSE M | 6.23 | 4.79 | 6.46 | 6.96 | 6.22 |
| F | 5.61 | 3.66 | 6.27 | 7.05 | 4.75 |
| RSQ M | .22 | .24 | .14 | .16 | .28 |
| F | .22 | .35 | .28 | .28 | .52 |

| | Av. Oper. | Av. Maint. | Av. Supply | Comm. Ctr. |
|---|---|---|---|---|
| AR | .23 | .43 | .31 | .35 |
| WK | .03 | .20 | .28 | .26 |
| AD | .08 | -.00 | .11 | .01 |
| CA | -.06 | .19 | .11 | .25 |
| MF | 24.51 | 5.96 | 28.83 | 16.64 |
| MF*AR | -.26 | -.04 | .06 | -.07 |
| MF*WK | -.08 | .04 | -.41 | -.18 |
| MF*AD | -.07 | .08 | -.05 | .00 |
| MF*CA | .11 | -.71 | -.30 | -.11 |
| CONSTANT | 69.61 | 43.20 | 44.47 | 47.98 |
| RMSE M | 5.42 | 7.29 | 7.28 | 6.54 |
| F | 4.81 | 6.33 | 6.69 | 5.14 |
| RSQ M | .14 | .22 | .21 | .28 |
| F | .01 | .14 | .15 | .21 |

Variables with leading MF represent interaction terms.
RMSE = root mean-squared error
RSQ = squared multiple correlation

Table 5

Tests of Differential Prediction
Hypotheses for Nine Marine Corps Training Courses

| Predictor | Ho: Parallel F | Rej.Lev. | Ho: Coincident F | Rej.Lev. |
|---|---|---|---|---|
| Administrative | | | | |
| CL | 2.29 | .13 | 20.47* | .00 |
| AR | .08 | .79 | 61.77* | .00 |
| WK | .05 | .83 | 39.08* | .00 |
| AD | .28 | .59 | 47.86* | .00 |
| CA | .38 | .54 | 55.92* | .00 |
| MULT | .11 | .98 | 10.97* | .00 |
| Personnel | | | | |
| CL | .02 | .89 | .96 | .39 |
| AR | .00 | .99 | 3.53* | .03 |
| WK | 1.11 | .29 | 2.75* | .07 |
| AD | .84 | .36 | 2.76* | .07 |
| CA | .53 | .47 | 2.59* | .08 |
| MULT | .22 | .93 | .91 | .48 |
| Unit Diary | | | | |
| CL | 6.34* | .07 | -- | -- |
| AR | 1.00 | .32 | 8.07* | .00 |
| WK | 2.21 | .14 | 5.61* | .00 |
| AD | 2.57 | .11 | 9.74* | .00 |
| CA | 1.07 | .30 | 7.73* | .00 |
| MULT | .89 | .47 | 2.40* | .04 |
| Basic Supply Stock | | | | |
| CL | 3.18* | .07 | -- | -- |
| AR | 3.28* | .07 | -- | -- |
| WK | 1.16 | .28 | 3.20* | .04 |
| AD | .06 | .80 | 8.41* | .00 |
| CA | .59 | .44 | 5.11* | .01 |
| MULT | .87 | .48 | 1.20 | .30 |
| Personal Financial Records | | | | |
| CL | 5.07* | .03 | -- | -- |
| AR | .96 | .33 | 8.21* | .00 |
| WK | 1.68 | .20 | 4.49* | .01 |
| AD | .19 | .66 | 2.82* | .06 |
| CA | .35 | .55 | 2.57* | .08 |
| MULT | .68 | .60 | 1.97* | .08 |

Table 5 Continued

| Predictor | Ho: Parallel F | Rej.Lev. | Ho: Coincident F | Rej.Lev. |
|---|---|---|---|---|
| Aviation Operations | | | | |
| CL | 1.14 | .29 | 4.96* | .01 |
| AR | 4.08* | .04 | -- | -- |
| WK | .81 | .37 | 9.04* | .00 |
| AD | 1.01 | .32 | 9.02* | .00 |
| CA | .11 | .74 | 11.12* | .00 |
| MULT | 1.05 | .38 | 2.86* | .02 |
| Aviation Maintenance Administration | | | | |
| CL | .47 | .49 | .54 | .58 |
| AR | 1.23 | .27 | 2.99* | .05 |
| WK | .67 | .42 | 1.78 | .17 |
| AD | .26 | .61 | 2.65* | .07 |
| CA | .53 | .47 | 2.79* | .06 |
| MULT | .71 | .59 | .90 | .48 |
| Aviation Supply | | | | |
| CL | 1.00 | .32 | 1.14 | .32 |
| AR | .09 | .76 | 5.96* | .00 |
| WK | 3.46* | .06 | -- | -- |
| AD | .15 | .70 | 4.90* | .01 |
| CA | .00 | .96 | 6.36* | .00 |
| MULT | 1.00 | .41 | 1.16 | .33 |
| Communications Center | | | | |
| CL | .28 | .60 | 1.51 | .22 |
| AR | 1.68 | .20 | 6.91* | .00 |
| WK | .43 | .51 | 3.74* | .02 |
| AD | .19 | .66 | 9.48* | .00 |
| CA | .51 | .48 | 8.16* | .00 |
| MULT | .91 | .46 | 1.71 | .13 |

* Indicates rejection of Ho at alpha = .10.

Table 6

Johnson-Neyman Regions of Rejection for
Nine Clerical Training Courses

| Training Course | Predictor | Region of Rejection | Proportion Affected Total | Proportion Affected Female |
|---|---|---|---|---|
| Administrative | CL | CL > 92 | .90 | .86 |
| | AR | 20 < AR < 80 | 1.00 | 1.00 |
| | WK | 20 < WK < 80 | 1.00 | 1.00 |
| | AD | 20 < AD < 80 | 1.00 | 1.00 |
| | CA | 0 < CA < 20 | 1.00 | 1.00 |
| Personnel | CL | No Region | ---- | ---- |
| | AR | 43 < AR < 61 | .69 | .73 |
| | WK | 40 < WK < 57 | .55 | .53 |
| | AD | 34 < AD < 59 | .62 | .42 |
| | CA | 12 < CA < 18 | .44 | .53 |
| Unit Diary | CL | CL > 112 | .58 | .81 |
| | AR | AR > 46 | .77 | .79 |
| | WK | WK > 53 | .60 | .73 |
| | AD | AD > 48 | .78 | .88 |
| | CA | 11 < CA < 20 | .56 | .69 |
| Basic Supply Stock | CL | CL > 116 | .33 | .67 |
| | AR | AR > 48 | .73 | .76 |
| | WK | 55 < WK < 77 | .39 | .65 |
| | AD | AD > 31 | .99 | .99 |
| | CA | CA > 11 | .50 | .79 |
| Personal Financial Records | CL | CL < 99 or CL > 123 | .26 | .44 |
| | AR | AR > 45 | .88 | .87 |
| | WK | WK > 55 | .64 | .71 |
| | AD | AD > 53 | .60 | .79 |
| | CA | 12 < CA < 19 | .48 | .67 |
| Aviation Operations | CL | 69 < CL < 124 | .90 | .74 |
| | AR | AR < 58 | .84 | .74 |
| | WK | 31 < WK < 64 | .97 | .95 |
| | AD | AD < 73 | .94 | .93 |
| | CA | CA > 5 | .98 | 1.00 |
| Aviation Maintenance Administration | CL | No Region | --- | --- |
| | AR | 26 < AR < 54 | .71 | .62 |
| | WK | 49 < WK < 57 | .41 | .32 |
| | AD | 46 < AD < 68 | .60 | .62 |
| | CA | 6 < CA < 14 | .67 | .38 |
| Aviation Supply | CL | No Region | --- | --- |
| | AR | No Region | --- | --- |
| | WK | WK < 59 | .79 | .52 |
| | AD | 36 < AD < 74 | .84 | .82 |
| | CA | 7 < CA < 17 | .82 | .96 |
| Communications Center | CL | No Region | --- | --- |
| | AR | AR < 59 | .82 | .75 |
| | WK | 42 < WK < 60 | .68 | .60 |
| | AD | AD > 41 | .88 | .98 |
| | CA | CA < 17 | .90 | .88 |

Table 7

Comparison of Male and Female
Predictions at the Female Mean
(Female SD Units)

| Training Course | Predictor CL | AR | WK | AD | CA | MULT |
|---|---|---|---|---|---|---|
| Administrative | -.40 | -.64 | -.55 | -.64 | -.68 | -.51 |
| Personnel | -.27 | -.50 | -.40 | -.43 | -.46 | -.42 |
| Unit Diary | -.50 | -.64 | -.54 | -.79 | -.64 | -.61 |
| Supply Stock | -.14 | -.35 | -.22 | -.40 | -.31 | -.20 |
| Pers. Fin. Rcds. | -.18 | -.50 | -.42 | -.36 | -.35 | -.45 |
| Av. Operations | -.62 | -.76 | -.88 | -.84 | -1.03 | -.70 |
| Av. Maintenance | -.17 | -.45 | -.38 | -.53 | -.52 | -.31 |
| Av. Supply | -.17 | -.55 | -.37 | -.53 | -.63 | -.23 |
| Comm. Center | -.24 | -.48 | -.39 | -.68 | -.61 | -.26 |
| Weighted Mean* | -.33 | -.57 | -.48 | -.59 | -.60 | -.44 |

*Female sample sizes used as weights.

Table 8

Regression Models for AR and WK in Nine Clerical Specialties

| | | Adminis-trative | Personnel | Unit Diary | Supply Stock | P. Fin. Records |
|---|---|---|---|---|---|---|
| AR | | .29 | .23 | .16 | .34 | .52 |
| WK | | .19 | .17 | .20 | .21 | .05 |
| MF | | 2.77 | 3.72 | -13.83 | -10.56 | -16.17 |
| MF*AR | | .04 | .06 | .11 | .20 | .10 |
| MF*WK | | - .02 | - .09 | .20 | .03 | .24 |
| CONSTANT | | 56.98 | 67.94 | 62.93 | 52.72 | 52.43 |
| RMSE | M | 6.29 | 4.82 | 6.56 | 7.00 | 6.24 |
| | F | 5.66 | 3.80 | 6.37 | 6.99 | 4.80 |
| RSQ | M | .21 | .22 | .09 | .15 | .27 |
| | F | .20 | .26 | .22 | .28 | .50 |

| | | Av. Oper. | Av. Maint. | Av. Supply | Comm. Ctr. |
|---|---|---|---|---|---|
| AR | | .25 | .44 | .33 | .36 |
| WK | | .06 | .20 | .27 | .24 |
| MF | | 24.34 | 14.24 | 26.23 | 16.45 |
| MF*AR | | - .27 | - .17 | .03 | - .07 |
| MF*WK | | - .12 | - .06 | - .44 | - .19 |
| CONSTANT | | 71.16 | 44.88 | 51.23 | 51.69 |
| RMSE | M | 5.48 | 7.27 | 7.40 | 6.58 |
| | F | 4.69 | 6.27 | 6.58 | 5.09 |
| RSQ | M | .10 | .21 | .18 | .25 |
| | F | .01 | .09 | .14 | .21 |

Table 9

Hypothesis Tests of Parallel and Coincident Regressions for AR and WK

| Course | Ho: Parallel F | Rej.Lev. | Ho: Coincident F | Rej.Lev. |
|---|---|---|---|---|
| Administrative | .26 | .77 | 29.44* | .00 |
| Personnel | .27 | .77 | 2.05 | .11 |
| Unit Diary | .99 | .37 | 3.97* | .01 |
| B. Supply | 1.90 | .15 | 3.35* | .02 |
| Fin. Rcds. | 1.28 | .29 | 5.40* | .00 |
| Av. Oper. | 2.23 | .11 | 5.78* | .00 |
| Av. Maint. | .39 | .68 | 1.06 | .37 |
| Av. Supply | 1.74 | .18 | 2.87* | .04 |
| Comm. Ctr. | 2.00 | .14 | 3.55* | .01 |

* Indicates rejection of Ho at alpha = .10.

Table 10

Comparisons of Male and Female
Predictions at the Female Mean
(Female SD Units)

| Training Course | Total Sample CL | Total Sample AR/WK | HS Graduates CL | HS Graduates AR/WK |
|---|---|---|---|---|
| Administrative | -.40 | -.62 | -.21 | -.47 |
| Personnel | -.27 | -.34 | -.19 | -.28 |
| Unit Diary | -.50 | -.81 | -.25 | -.50 |
| Supply Stock | -.14 | -.35 | -.14 | -.28 |
| Pers. Fin. Rcds. | -.18 | -.74 | -.17 | -.71 |
| Av. Operations | -.62 | -.74 | -.59 | -.70 |
| Av. Maintenance | -.17 | -.40 | -.06 | -.26 |
| Av. Supply | -.17 | -.53 | .06 | -.20 |
| Comm. Center | -.24 | -.33 | -.05 | -.16 |
| Weighted Mean* | -.33 | -.56 | -.18 | -.42 |

*Female sample sizes used as weights.

Navy

1 CDR Robert J. Biersner
Naval Medical R&D Command
National Naval Medical Center
Bethesda, MD 20814

1 Dr. Nick Bond
Office of Naval Research
Liaison Office, Far East
APO San Francisco, CA 96503

1 Lt. Alexander Bory
Applied Psychology
Measurement Division
NAMRL
NAS Pensacola, FL 32508

1 Dr. Stanley Collyer
Office of Naval Technology
800 N. Quincy Street
Arlington, VA 22217

1 Dr. Charles E. Davis
Personnel and Training Research
Office of Naval Research (Code 442PT)
800 North Quincy Street
Arlington, VA 22217

1 Dr. Richard Elster
Department of Administrative Sciences
Naval Postgraduate School
Monterey, CA 93940

1 Mr. Paul Foley
Navy Personnel R&D Center
San Diego, CA 92152

1 Mr. Dick Hoshaw
NAVOP-135
Arlington Annex
Room 2834
Washington, DC 20350

1 Dr. Norman J. Kerr
Chief of Naval Technical Training
Naval Air Station Memphis (75)
Millington, TN 38054

1 Dr. William L. Maloy (02)
Chief of Naval Education and Training
Naval Air Station
Pensacola, FL 32508

1 Dr. Kreale Marshall
Chairman, Operations Research Dept.
Naval Post Graduate School
Monterey, CA 93940

1 Dr. James McBride
Navy Personnel R&D Center
San Diego, CA 92152

1 Cdr Ralph McCumber
Director, Research & Analysis Division
Navy Recruiting Command
4015 Wilson Boulevard
Arlington, VA 22203

1 Dr. George Moeller
Director, Behavioral Sciences Dept.
Naval Submarine Medical Research Lab
Naval Submarine Base
Groton, CT 06349

1 Library, Code P201L
Navy Personnel R&D Center
San Diego, CA 92152

1 Technical Director
Navy Personnel R&D Center
San Diego, CA 92152

6 Commanding Officer
Naval Research Laboratory
Code 2627
Washington, DC 20390

1 Psychological Sciences Division
Code 442
Office of Naval Research
Arlington, VA 22217

1 Organizational Effectiveness
Research Group, Code 4420E
Office of Naval Research
Arlington, VA 22217

6 Personnel & Training Research Group
Code 442PT
Office of Naval Research
Arlington, VA 22217

1 Office of the Chief of Naval Operations
Research Development & Studies Branch
OP 115
Washington, DC 20350

Navy

1 LT Frank C. Petho, MSC, USN (Ph.D)
CNET (N-432)
NAS
Pensacola, FL 32508

1 Dr. Bernard Rimland (01C)
Navy Personnel R&D Center
San Diego, CA 92152

1 Dr. Carl Ross
CNET-PDCD
Building 90
Great Lakes NTC, IL 60088

1 Mr. Drew Sands
NPRDC Code 62
San Diego, CA 92152

1 Lt. Marybeth Schnable
COMNAVCRUITCOM
Code 215
4015 Wilson Blvd
Arlington, VA 22206

1 Dr. Robert G. Smith
Office of Chief of Naval Operations
OP-987H
Washington, DC 20350

1 Dr. Alfred F. Smode, Director
Department N-7
Naval Training Equipment Center
Orlando, FL 32813

1 Dr. Richard Snow
Liaison Scientist
Office of Naval Research
Branch Office, London
Box 39
FPO New York, NY 09510

1 Dr. Richard Sorensen
Navy Personnel R&D Center
San Diego, CA 92152

1 Dr. Frederick Steinheiser
CNO - OP115
Navy Annex
Arlington, VA 20370

1 Mr. Brad Sympson
Navy Personnel R&D Center
San Diego, CA 92152

Navy

1 Dr. James Tweeddale
Technical Director
Navy Personnel R&D Center
San Diego, CA 92152

1 Dr. Frank Vicino
Navy Personnel R&D Center
San Diego, CA 92152

1 Dr. Douglas Wetzel
Code 12
Navy Personnel R&D Center
San Diego, CA 92152

1 DR. MARTIN F. WISKOFF
NAVY PERSONNEL R& D CENTER
SAN DIEGO, CA 92152

1 Mr John H. Wolfe
Navy Personnel R&D Center
San Diego, CA 92152

1 Capt. Bruce Young
COMNAVCRUITCOM
Code 21
4015 Wilson Blvd
Arlington, VA 22206

1 Cmdr. Joe Young
HQ, MEPCOM
ATTN: MEPCT-P
2500 Green Bay Road
North Chicago, IL 60064

Marine Corps

1 Capt. Rick Butler
CAT Project Office
HQ, Marine Corps
Washington, DC 20380

1 Mr. Paul DiRenzo
Commandant of the Marine Corps
Code LBC-4
Washington, DC 20380

1 H. William Greenup
Education Advisor (E031)
Education Center, MCDEC
Quantico, VA 22134

1 Maj. John Keene
ADP Systems Branch
C3 Development Center (D104)
MCDEC
Quantico , VA 22134

1 Jerry Lehnus
CAT Project Office
HQ Marine Corps
Washington , DC 20380

1 Col. Ray Leidich
Headquarters, Marine Corps
MPI
Washington, DC 20380

1 Director, Office of Manpower Utilizatio
HQ, Marine Corps (MPU)
BCB, Bldg. 2009
Quantico, VA 22134

1 Headquarters, U. S. Marine Corps
Code MPI-20
Washington, DC 20380

Lt. Col. Jim Murphy
HQ, Marine Corps
Code MPRP
Washington, DC 20380

1 Special Assistant for Marine
Corps Matters
Code 100M
Office of Naval Research
800 N. Quincy St.
Arlington, VA 22217

Marine Corps

1 DR. A.L. SLAFKOSKY
SCIENTIFIC ADVISOR (CODE RD-1)
HQ, U.S. MARINE CORPS
WASHINGTON, DC 20380

1 Major Frank Yohannan, USMC
Headquarters, Marine Corps
(Code MPI-20)
Washington, DC 20380

Army

1 Technical Director
U. S. Army Research Institute for the
Behavioral and Social Sciences
5001 Eisenhower Avenue
Alexandria, VA 22333

1 Dr. Kent Eaton
Army Research Institute
5001 Eisenhower Blvd.
Alexandria , VA 22333

1 Lt. Col Rich Entlich
HQ, Dept. of the Army
OCSA(DACS-DPM)
Washington, DC 20310

1 Dr. Beatrice J. Farr
U. S. Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

1 Dr. Myron Fischl
U.S. Army Research Institute for the
Social and Behavioral Sciences
5001 Eisenhower Avenue
Alexandria, VA 22333

1 Lt. Col. Ron Harmer
USARCRC-RS
Ft. Sheridan, IL 60037

1 Dr. Milton S. Katz
Training Technical Area
U.S. Army Research Institute
5001 Eisenhower Avenue
Alexandria, VA 22333

1 Dr. Clessen Martin
Army Research Institute
5001 Eisenhower Blvd.
Alexandria, VA 22333

1 Dr. William E. Nordbrock
FMC-ADCO Box 25
APO, NY 09710

1 Mr. Robert Ross
U.S. Army Research Institute for the
Social and Behavioral Sciences
5001 Eisenhower Avenue
Alexandria, VA 22333

Army

1 Mr. Lou Ruberton
DAPE-MPA-C3
Department of the Army
Washington, DC 20310

1 Dr. Joyce Shields
Army Research Institute for the
Behavioral and Social Sciences
5001 Eisenhower Avenue
Alexandria, VA 22333

1 Ms. Betty Stickel
DAPE-MFA-P
2B729 Pentagon
Washington, DC 20310

1 Dr. Hilda Wing
Army Research Institute
5001 Eisenhower Ave.
Alexandria, VA 22333

Air Force

1 Air Force Human Resources Lab
AFHRL/MPD
Brooks AFB, TX 78235

1 Technical Documents Center
Air Force Human Resources Laboratory
WPAFB, OH 45433

1 U.S. Air Force Office of Scientific Research
Life Sciences Directorate, NL
Bolling Air Force Base
Washington, DC 20332

1 Air University Library
AUL/LSE 76/443
Maxwell AFB, AL 36112

1 Dr. Earl A. Alluisi
HQ, AFHRL (AFSC)
Brooks AFB, TX 78235

1 Col. Roger Campbell
AF/MPXOA
Pentagon, Room 4E195
Washington, DC 20330

1 Mr. Raymond E. Christal
AFHRL/MOE
Brooks AFB, TX 78235

1 Dr. Alfred R. Fregly
AFOSR/NL
Bolling AFB, DC 20332

1 Dr. Genevieve Haddad
Program Manager
Life Sciences Directorate
AFOSR
Bolling AFB, DC 20332

1 Dr. Patrick Kyllonen
AFHRL/MOE

Brooks AFB, TX 78235

1 Mr. Randolph Park
AFHRL/MOAN
Brooks AFB, TX 78235

1 Lt. Col. Dave Payne
AFHRL/MOE
Brooks AFB, TX 78235

Air Force

1 Dr. Roger Pennell
Air Force Human Resources Laboratory
Lowry AFB, CO 80230

1 Dr. Malcolm Ree
AFHRL/MP
Brooks AFB, TX 78235

1 Maj. Bill Strickland
AF/MPXOA
4E168 Pentagon
Washington, DC 20330

1 Lt. Col James E. Watson
HQ USAF/MPXOA
The Pentasgon
Washington, DC 20330

1 Major John Welsh
AFHRL/MOAN
Brooks AFB , TX

Department of Defense

1 Mr. Bob Brandewie
Defense Manpower Data Center
550 Camino El Estero, #200
Monterey, CA 93940

1 Mr. J. Burgener
MEPCOM
MEPCT-P
2500 Green Bay Road
North Chicago, IL 60064

1 LCmdr. Tom Dean
HQ, MEPCOM
MEPCAM-P
2500 Green Bay Road
North Chicago , IL 60064

12 Defense Technical Information Center
Cameron Station, Bldg 5
Alexandria, VA 22314
Attn: TC

1 Dr. William Graham
Testing Directorate
MEPCOM/MEPCT-P
Ft. Sheridan, IL 60037

1 Dr. Clarence McCormick
HQ, MEPCOM
MEPCT-P
2500 Green Bay Road
Noprth Chicago, IL 60064

1 Military Assistant for Training and
Personnel Technology
Office of the Under Secretary of Defens
for Research & Engineering
Room 3D129, The Pentagon
Washington, DC 20301

1 Col. Van Poznak
HQ, MEPCOM
ATTN: Director MEPCAM
2500 Green Bay Raod
North Chicago, IL 60064

1 Dr. W. Steve Sellman
Office of the Assistant Secretary
of Defense (MRA & L)
2B269 The Pentagon
Washington, DC 20301

Department of Defense

1 Mr. John Stryker
HQ, MEPCOM
MEPCAM
2500 Green Bay Road
North Chicago, IL 60064

1 Major Jack Thorpe
DARPA
1400 Wilson Blvd.
Arlington, VA 22209

1 Dr. Robert A. Wisher
OUSDRE (ELS)
The Pentagon, Room 3D129
Washington, DC 20301

Civilian Agencies

1 Dr. Bob Frey
Commandant (G-P-1/2)
USCG HQ
Washington, DC 20593

1 Dr. Vern W. Urry
Personnel R&D Center
Office of Personnel Management
1900 E Street NW
Washington, DC 20415

1 Mr. Thomas A. Warm
U. S. Coast Guard Institute
P. O. Substation 18
Oklahoma City, OK 73169

1 Dr. Joseph L. Young, Director
Memory & Cognitive Processes
National Science Foundation
Washington, DC 20550

Private Sector

1 Dr. James Algina
University of Florida
Gainesville, FL 326

1 Dr. Erling B. Andersen
Department of Statistics
Studiestraede 6
1455 Copenhagen
DENMARK

1 1 Psychological Research Unit
NBH-3-44 Attn
Northbourne House
Turner ACT 2601
AUSTRALIA

1 Dr. Isaac Bejar
Educational Testing Service
Princeton, NJ 08450

1 Dr. Menucha Birenbaum
School of Education
Tel Aviv University
Tel Aviv, Ramat Aviv 69978
Israel

1 Dr. Werner Birke
Personalstammamt der Bundeswehr
D-5000 Koeln 90
WEST GERMANY

1 Dr. R. Darrell Bock
Department of Education
University of Chicago
Chicago, IL 60637

1 Dr. Robert Brennan
American College Testing Programs
P. O. Box 168
Iowa City, IA 52243

1 Dr. Paul Brower
FEDSIM/NA
6118 Franconia Road
Alexandria , VA 22310

1 Bundministerium der Verteidigung
-Referat P II 4-
Psychological Service
Postfach 1328
D-5300 Bonn 1
F. R. of Germany

Private Sector

1 Dr. Ernest R. Cadotte
307 Stokely
University of Tennessee
Knoxville, TN 37916

1 Dr. John B. Carroll
409 Elliott Rd.
Chapel Hill, NC 27514

1 Dr. Kenneth E. Clark
President
Center for Creative Leadership
5000 Laurinda Dr.
P. O. Box P-1
Greensboro, NC 27402

1 Dr. Norman Cliff
Dept. of Psychology
Univ. of So. California
University Park
Los Angeles, CA 90007

1 Dr. Hans Crombag
Education Research Center
University of Leyden
Boerhaavelaan 2
2334 EN Leyden
The NETHERLANDS

1 CTB/McGraw-Hill Library
2500 Garden Road
Monterey, CA 93940

1 Dr. Dattpradad Divgi
Syracuse University
Department of Psychology
Syracuse, NE 33210

1 Dr. Hei-Ki Dong
Ball Foundation
Room 314, Building B
800 Roosevelt Road
Glen Ellyn, IL 60137

1 Dr. Fritz Drasgow
Department of Psychology
University of Illinois
603 E. Daniel St.
Champaign, IL 61820

1 Dr. Susan Embertson
PSYCHOLOGY DEPARTMENT
UNIVERSITY OF KANSAS
Lawrence, KS 66045

Private Sector

1 ERIC Facility-Acquisitions
4833 Rugby Avenue
Bethesda, MD 20014

1 Dr. Benjamin A. Fairbank, Jr.
McFann-Gray & Associates, Inc.
5825 Callaghan
Suite 225
San Antonio, TX 78228

1 Dr. Leonard Feldt
Lindquist Center for Measurment
University of Iowa
Iowa City, IA 52242

1 Dr. Richard L. Ferguson
The American College Testing Program
P.O. Box 168
Iowa City, IA 52240

1 Dr. Victor Fields
Dept. of Psychology
Montgomery College
Rockville, MD 20850

1 Univ. Prof. Dr. Gerhard Fischer
Liebiggasse 5/3
A 1010 Vienna
AUSTRIA

1 Professor Donald Fitzgerald
University of New England
Armidale, New South Wales 2351
AUSTRALIA

1 Dr. Dexter Fletcher
University of Oregon
Department of Computer Science
Eugene, OR 97403

1 Dr. John R. Frederiksen
Bolt Beranek & Newman
50 Moulton Street
Cambridge, MA 02138

1 Dr. Robert Glaser
Learning Research & Development Center
University of Pittsburgh
3939 O'Hara Street
PITTSBURGH, PA 15260

Private Sector

1 Dr. Bert Green
Johns Hopkins University
Department of Psychology
Charles & 34th Street
Baltimore, MD 21218

1 Mr. David Gurtner
FEDSIM/NA
6118 Franconia Road
Alexandria, VA 22310

1 Dr. Ron Hambleton
School of Education
University of Massachusetts
Amherst, MA 01002

1 Dr. Susan Hardwicke
Rehab Group, Inc.
1360 Rosecrans Street (Suite 1)
San Diego, CA 92106

1 Dr. Delwyn Harnisch
University of Illinois
242b Education
Urbana, IL 61801

1 Dr. Paul Horst
677 G Street, #184
Chula Vista, CA 90010

1 Dr. Lloyd Humphreys
Department of Psychology
University of Illinois
[illegible] East Daniel Street
Champaign, IL 61820

1 Dr. Steven Hunka
Department of Education
University of Alberta
Edmonton, Alberta
CANADA

1 Dr. Earl Hunt
Dept. of Psychology
University of Washington
Seattle, WA 98105

1 Dr. Jack Hunter
2122 Coolidge St.
Lansing, MI 48906

Private Sector

1 Dr. Huynh Huynh
College of Education
University of South Carolina
Columbia, SC 29208

1 Dr. Douglas H. Jones
Advanced Statistical Technologies
Corporation
10 Trafalgar Court
Lawrenceville, NJ 08148

1 Professor John A. Keats
Department of Psychology
The University of Newcastle
N.S.W. 2308
AUSTRALIA

1 Dr. William Koch
University of Texas-Austin
Measurement and Evaluation Center
Austin, TX 78703

1 Dr. Michael Levine
Department of Educational Psychology
210 Education Bldg.
University of Illinois
Champaign, IL 61801

1 Dr. Charles Lewis
Faculteit Sociale Wetenschappen
Rijksuniversiteit Groningen
Oude Boteringestraat 23
9712GC Groningen
Netherlands

1 Dr. Robert Linn
College of Education
University of Illinois
Urbana, IL 61801

1 Dr. Frederic M. Lord
Educational Testing Service
Princeton, NJ 08541

1 Dr. James Lumsden
Department of Psychology
University of Western Australia
Nedlands W.A. 6009
AUSTRALIA

1 Dr. Gary Marco
Stop 31-E
Educational Testing Service
Princeton, NJ 08451

Private Sector

1 Dr. Scott Maxwell
Department of Psychology
University of Notre Dame
Notre Dame, IN 46556

1 Dr. Samuel T. Mayo
Loyola University of Chicago
820 North Michigan Avenue
Chicago, IL 60611

1 William J. McLaurin
66610 Howie Court
Camp Springs, MD 20031

1 Dr. Barbara Means
Human Resources Research Organization
300 North Washington
Alexandria, VA 22314

1 Dr. Robert Mislevy
711 Illinois Street
Geneva, IL 60134

1 Dr. Melvin R. Novick
356 Lindquist Center for Measurment
University of Iowa
Iowa City, IA 52242

1 Dr. James Olson
WICAT, Inc.
1875 South State Street
Orem, UT 84057

1 Dr. Jesse Orlansky
Institute for Defense Analyses
1801 N. Beauregard St.
Alexandria, VA 22311

1 Wayne M. Patience
American Council on Education
GED Testing Service, Suite 20
One Dupont Cirle, NW
Washington, DC 20036

1 Dr. James A. Paulson
Portland State University
P.O. Box 751
Portland, OR 97207

1 Dr. Sam Pearson
CACI, Inc. FED.
Department 5921
1815 North Fort Myers Drive
Arlington, VA 22209

Private Sector

1 Dr. Mark D. Reckase
ACT
P. O. Box 168
Iowa City, IA 52243

1 Dr. Thomas Reynolds
University of Texas-Dallas
Marketing Department
P. O. Box 688
Richardson, TX 75080

1 Mr. Ken Rieck
FEDSIM/NA
6118 Franconia Road
Alexandria, VA 22310

1 Dr. Andrew M. Rose
American Institutes for Research
1055 Thomas Jefferson St. NW
Washington, DC 20007

1 Dr. J. Ryan
Department of Education
University of South Carolina
Columbia, SC 29208

1 PROF. FUMIKO SAMEJIMA
DEPT. OF PSYCHOLOGY
UNIVERSITY OF TENNESSEE
KNOXVILLE, TN 37916

1 Frank L. Schmidt
Department of Psychology
Bldg. GG
George Washington University
Washington, DC 20052

1 Lowell Schoer
Psychological & Quantitative
Foundations
College of Education
University of Iowa
Iowa City, IA 52242

1 Dr. Kazuo Shigemasu
7-9-24 Kugenuma-Kaigan
Fujusawa 251
JAPAN

1 Dr. Edwin Shirkey
Department of Psychology
University of Central Florida
Orlando, FL 32816

Private Sector

1 Dr. William Sims
Center for Naval Analysis
200 North Beauregard Street
Alexandria, VA 22311

1 Dr. H. Wallace Sinaiko
Program Director
Manpower Research and Advisory Services
Smithsonian Institution
801 North Pitt Street
Alexandria, VA 22314

1 Dr. Peter Stoloff
Center for Naval Analysis
200 North Beauregard Street
Alexandria, VA 22311

1 Dr. William Stout
University of Illinois
Department of Mathematics
Urbana, IL 61801

1 Dr. Hariharan Swaminathan
Laboratory of Psychometric and
Evaluation Research
School of Education
University of Massachusetts
Amherst, MA 01003

1 Dr. Kikumi Tatsuoka
Computer Based Education Research Lab
252 Engineering Research Laboratory
Urbana, IL 61801

1 Dr. Maurice Tatsuoka
220 Education Bldg
1310 S. Sixth St.
Champaign, IL 61820

1 Dr. David Thissen
Department of Psychology
University of Kansas
Lawrence, KS 66044

1 Dr. Robert Tsutakawa
Department of Statistics
University of Missouri
Columbia, MO 65201

1 Dr. David Vale
Assessment Systems Corporation
2233 University Avenue
Suite 310
St. Paul, MN 55114

Private Sector

1 Dr. Howard Wainer
Division of Psychological Studies
Educational Testing Service
Princeton, NJ 08540

1 Dr. Brian Waters
HumRRO
300 North Washington
Alexandria, VA 22314

1 Dr. David J. Weiss
N660 Elliott Hall
University of Minnesota
75 E. River Road
Minneapolis, MN 55455

1 Dr. Donald O. Weitzman
Mitre Corporation
1820 Dolley Madison Blvd
McLean, VA 22102

1 DR. GERSHON WELTMAN
PERCEPTRONICS INC.
6271 VARIEL AVE.
WOODLAND HILLS, CA 91367

1 Dr. Rand R. Wilcox
University of Southern California
Department of Psychology
Los Angeles, CA 90007

1 Wolfgang Wildgrube
Streitkraefteamt
Box 20 50 03
D-5300 Bonn 2
WEST GERMANY

1 Dr. Bruce Williams
Department of Educational Psychology
University of Illinois
Urbana, IL 61801

Additional Names

1 Dr. Frank Erwin
President
Richardson, Bellows, Henry & Co.
Suite 612
1140 Connecticut Avenue, NW
Washington, DC 20036

1 Dr. Lorraine Eyde
Office of Personnel Research &
Development Center
1900 E Street, NW
Washington, DC 20415

1 Dr. Milt Hakel
Ord Inc.
2455 N. Star Road
Suite 303
Columbus, OH 43221

1 Dr. Samuel Messick
Vice President for Research
Educational Testing Service
Princeton, NJ 08541

1 Dr. Nancy Petersen
Educational Testing Service
Princeton, NJ 08541

1 Dr. Mary Tenopyr
AT & T
550 Madison Avenue
Room 1141
New York, NY 10022

1 Dr. Alexandra Wigdor
National Research Council
2101 Constitution Avenue, NW
Washington, DC 20418

END

FILMED

5-85

DTIC